

REMARKS

Claims 54-83 are pending in this application. By this Amendment, Claims 54, 62, 63, 66, 68-78 and 80 are amended, and Claims 81-83 are added. Favorable reconsideration is respectfully requested in light of the following Remarks.

1. The Office action rejects Claims 54-65 under 35 U.S.C. §112, first paragraph, asserting that the limitation that the unreacted crosslinking agent in the inner layer must react with functional groups in the outer layer to be critical to the practice of the instant invention. The rejection is respectfully traversed.

Applicant agrees that interfacial chemical bond is obtained between the outer layer 26 and the inner layer 28 to form the layered composite structure 24. However, Applicant asserts that the claimed invention is NOT limited to a specific mechanism of how this interfacial chemical bond is obtained, contrary to the Office action. As stated in the specification, the interfacial chemical bond of the present invention is not intended to be limited by any theory.

See Paragraph [0047].

To satisfy the best mode requirement, the specification describes several examples of compositions that can be used to obtain the interfacial chemical bond between the outer and inner layers. For example, interfacial chemical bonding between the inner and outer layers 26 and 28 can be attained where the composition 42 for preparing the inner layer 28 comprises a PVC resin material with at least one suitable plasticizer. In addition to being reactive with the PVC constituent of the inner layer 28, the plasticizer of the composition 42 can contain one or more pendent functional groups, such as hydroxyl and/or carboxyl functional groups, that are highly reactive with unreacted functional groups of carbodiimide in the outer layer 26 that have not reacted with the pendent functional groups of the polyurethane of the outer layer 26. Unreacted functional groups of the carbodiimide penetrate into the inner layer 28 and react with the pendent functional groups of the plasticizer during casting. As a result, the carbodiimide crosslinks the polyurethane of the outer layer 26 with the plasticizer of the PVC composition 42, and thereby forms interfacial chemical bonding between the inner surface 26b of the outer layer 26 and the adjacent outer surface 28a of the inner layer 28.

In another example, interfacial chemical bonding between the inner and outer layers 26 and 28 can be attained where the composition 42 for preparing the inner layer 28 comprises a thermoplastic polyurethane. The thermoplastic polyurethane of the inner layer 28 can contain one or more ethylenically unsaturated bonds in its backbone that are highly reactive with unreacted functional groups of carbodiimide in the outer layer 26 that have not reacted with the pendent functional groups of the polyurethane of the outer layer 26. Unreacted functional groups of the carbodiimide penetrate into the inner layer 28 and react with the ethylenically unsaturated bonds of the composition 42. Additionally or in the alternative, excess polyols can also be provided in forming the polyurethane of the outer layer 26, allowing the penetrated carbodiimide to react with the hydroxyl groups of the polyols. As a result, the carbodiimide crosslinks the crosslinked polyurethane of the outer layer 26 with the thermoplastic polyurethane of the second composition 42, and thereby forms interfacial chemical bonding between the inner surface 26b of the outer layer 26 and the adjacent outer surface 28a of the inner layer 28. Thus, the claimed invention is not limited by the mechanism by which the interfacial chemical bonding to form the layered composite structure 24 takes place. *See Paragraphs [0047] - [0050] of the Substitute Specification. See also Paragraphs [0075] and [0083] of the Substitute Specification.*

In view of the foregoing, Applicant respectfully submits that the specific mechanism of how the interfacial chemical bonding is obtained between the inner and outer layers is NOT critical to the claimed invention, and that the rejection under 35 USC §112, first paragraph is misplaced.

However, to further define patentable subject matter of the invention, Claim 54 is amended to specify, *inter alia*, that an interfacial chemical bond is formed between at least one of unreacted functional groups of one of the at least one light-stable aliphatic thermoplastic polyurethane and the heat activated cross linking monomer or agent of the outer layer and of one the at least one ethylenically unsaturated bond and at least one pendent hydroxyl group of the inner layer. Withdrawal of the rejection is respectfully requested.

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2. The Office action rejects Claims 66-80 under the judicially created doctrine of obviousness-type double patenting over Claims 1-21 of U.S. Patent No. 5,885,662 (hereinafter, “the ‘662 patent”) in view of *The Encyclopedia of Polymer Science and Engineering*, Vol. 3, Nov., 1985, pages 552-567. The rejection is respectfully traversed.

Applicant agrees with the Office action that the ‘662 patent does not teach casting the thermoplastic polyurethane having pendent hydroxyl groups, as recited in Claim 66. However, to overcome this shortcoming, the Office action asserts that it would have been obvious to combine the teachings of the ‘662 patent with the teachings of *The Encyclopedia of Polymer Science and Engineering* to meet the claimed invention. Applicant respectfully disagrees with this assertion for several reasons.

First, the claimed invention is not directed to a casting a coating, as taught in *The Encyclopedia of Polymer Science and Engineering*. Specifically, the claimed invention is directed to casting an inner layer or backing layer onto an outer layer or coating layer. Thus, the different coating methods given in Table I of *The Encyclopedia of Polymer Science and Engineering* are not applicable to the claimed invention.

Second, even if the different coating methods given in Table I were applicable to the claimed invention, the coating methods are not equivalent coating methods, but alternative coating methods. As stated in the first paragraph on Page 552:

“The selection of a particular method depends on product requirements, availability of equipment, and manufacturer preference.”

Thus, the cited passage given above explicitly states that the different coating methods given in Table I are not equivalent methods, but are alternative methods that can be used when applying a coating of polymeric film-forming material.

As a further indication that the different coating methods given in Table I are not equivalent methods, but are alternative methods, Table I provides different product requirements and operating parameters for each different coating method listed in Table I. For example, the usual coating speed for cast coating is between 3 and 60 m/min, whereas the usual coating speed for sprays is between 3 and 90 m/min. In another example, the viscosity range for cast coating is between 1,000 and 5,000 cP, whereas the viscosity range for sprays is

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completely different. In yet another example, the wet coating thickness for cast coating is in the range between 50 and 500 μm , whereas the wet coating thickness for sprays is in the range between 2 and 250 μm .

Third, one skilled in the art would recognize that the casting process is not equivalent to the spraying process because the casting process is performed at a different temperature and preferably with different materials than the spraying process. Specifically, the casting process relies on relatively high temperatures (approx. 200 degrees C) to melt the material, preferably a thermoplastic material in a powder form, to form the desired shape of the part. Because the casting process is performed at high temperature, the part can not be readily demolded, but the operator must temperature cycle the equipment (i.e., heat up and cool down the equipment) during manufacturing of the part. On the other hand, the spraying process relies on relatively low temperatures (approx. 60 degrees C) that enables the material, preferably a thermoset material, to chemically interact with another material, unlike the casting process in which the material is melted. Because the spraying process is performed at relatively low temperature, the part can be readily demolded, resulting in a shorter cycle time as compared to the casting process.

In view of the foregoing, Applicant asserts that the various coating methods given in Table I are not equivalent to each other, but rather are alternative methods, and the obviousness-type double patenting rejection is misplaced. Withdrawal of the rejection is respectfully requested.

In view of the foregoing, Applicant respectfully submits that the application is in condition for allowance. Favorable consideration and prompt allowance of the application is earnestly solicited.

Should Examiner Uhlir believe anything further would be desirable in order to place the application in better condition for allowance; the Examiner is invited to contact the undersigned attorney at the telephone number listed below.

It is believed that any additional fees due with respect to this paper have already been identified. However, if any additional fees are required in connection with the filing of this paper, permission is given to charge account number 50-3145 in the name of Honigman Miller Schwartz and Cohn LLP.

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Respectfully submitted,



SIGNATURE OF PRACTITIONER

Peter J. Rashid, Reg. No. 39,464
Honigman Miller Schwartz and Cohn LLP
32270 Telegraph Road
Suite 225
Bingham Farms, MI 48025-2457

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